DOCUMENT RESUME

ED 410 478 CG 027 876

AUTHOR Niemivirta, Markku
TITLE Gender Differences in Motivational-Cognitive Patterns of Self-Regulated Learning.
PUB DATE 1997-03-00
NOTE 24p.; Paper presented at the Annual Meeting of the American Educational Research Association (Chicago, IL, March 24-28, 1997).
PUB TYPE Information Analyses (070) -- Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Adolescents; Cognitive Processes; *Cognitive Style; Goal Orientation; Grade 7; Junior High Schools; *Learning Motivation; *Learning Processes; Learning Strategies; Motivation; Self Esteem; Self Motivation; *Sex Differences; *Thinking Skills
IDENTIFIERS *Self Regulated Learning

ABSTRACT

Many of the reasons offered for the difference between boys and girls in certain kinds of cognitive tasks have been attributed to biology. However, other factors need to be considered, and so the role that motivation and learning play in gender differences is addressed in this paper. The focus rests on gender differences, both in the individual factors affecting self-regulatory learning activity, and in the relations among these factors. A dispositional approach to motivation was adopted in order to examine individual differences at a general level. Self-report measures assessing goal orientations, control beliefs, self-esteem, and learning strategy use were administered to 628 seventh-grade students. The findings were consistent with previous research in that boys' and girls' motivational-cognitive profiles were slightly different. Boys were more inclined to performance goals and they reported using more superficial learning strategies (e.g., rote-learning and detail memorizing) than girls. The results also suggest that students' motivational orientations and the underlying mechanisms might differ as a function of gender. These findings have implications for research on self-regulated learning in general and gender differences in particular. (Contains 50 references.) (RJM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 410 478

Gender Differences in Motivational-Cognitive Patterns of Self-Regulated Learning

Markku Niemivirta

Department of Education
University of Helsinki

BEST COPY AVAILABLE

CG027876

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

M. Niemivirta

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Gender Differences in Motivational-Cognitive Patterns of Self-Regulated Learning

MARKKU NIEMIVIRTA*
Department of Education, University of Helsinki

ABSTRACT

This paper addresses the question of gender differences in motivation and learning. The main goal was to examine gender differences both in the individual factors affecting self-regulatory learning activity, and in the relations among these factors. Self-report measures assessing goal orientations, control beliefs, self-esteem, and learning strategy use were administered to 628 seventh-grade junior high school students. Both pattern-oriented (e.g., cluster-analytic approach) and variable-oriented analyses (e.g., structural equation modeling) were performed on the data. Results showed that boys' and girls' motivational-cognitive profiles were slightly different. Boys were more inclined to performance goals and reported using more superficial learning strategies (e.g., rote-learning and detail memorizing) than girls. The results also suggest that students' motivational orientations and the underlying mechanisms might differ as a function of gender.

INTRODUCTION

Gender differences have been of great interest in educational and psychological research (cf. Maccoby & Jacklin, 1974). Studies focusing on learning have mainly examined gender-related differences in either cognitive antecedents (Halpern, 1992) or general outcomes (i.e., achievement and performance) of learning (Hyde, Fennema & Lamon, 1990; Linn & Hyde, 1989; Kahle & Meece, 1994). Studies on cognitive abilities have showed fairly consistent gender differences – at least for memory, language fluency, and mathematical reasoning abilities – over the past decades, and similar gaps have also been found in achievement: Boys have outperformed girls in cognitive tasks requiring mechanical reasoning or visuo-spatial processing, whereas girls have done better in tasks requiring verbal abilities (Stumpf, 1995; although see Lynn & Hyde, 1989). Furthermore, boys score higher than girls in science and mathematics achievement tests, while the opposite may be true in languages (Halpern, 1992; Marsh, 1989).

These differences have been explained mostly in terms of biological factors, gender-role stereotypes and socialization experiences (e.g., Eccles-Parsons et al., 1982; Halpern, 1992). The underlying assumption in explanations emphasizing societal factors is that differential sex-role socialization patterns affect the school-related attitudes, values, and self-perceptions students' develop as they grow up, which in turn affect the quality and form of activities students' employ in learning situations. A large body of studies have demonstrated that girls do have lower expectations of success and less confidence in their ability to learn in, for example, mathematics than boys (e.g., Eccles, 1985). On the other hand, Skaalvik and Rankin (1995) found that girls were more motivated to study languages than boys despite the fact that there were no differences in their verbal self-confidence. Similar results were obtained in a study by Marsh (1989).[1] However, there is also evidence that gender-differences might vary according to the measurements used. For example, Benbow and Stanley (1982) noticed that during the junior high school and high school years girls achieved significantly higher mathematics grades than did boys (see also Stockard & Wood, 1984). Based on this, some researchers have hypothesized that girls might adopt a rote learning approach to mathematics that proves an advantage on classroom exams, whereas boys tend have a more autonomous approach on mathematics learning that facilitates performance on standardized tests (Bohlin, 1994; Kimball, 1989; see also Fennema & Peterson, 1985). However, considering the facts that studies examining this assumption do not provide unambiguous findings (cf. Meece & Jones, 1996), and that similar gender differences (i.e., girls earn higher grades) can also be found in overall school achievement – at least In Scandinavia (Emanuelsson & Fischbein, 1986; Undheim & Nordvik, 1992) –, the explanation needs further elaboration. The focus of the present study is thus on gender differences in motivation and self-perceptions at a more general level.

* Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL, March 1997. Please address all correspondence to: Markku Niemivirta, Department of Education, P.O.Box 39, University of Helsinki, Finland. E-mail: markku.niemivirta@helsinki.fi

[1] There is also evidence of gender differences in the accuracy and bias of self-evaluations of performance. According to Beyer and Bowden (*in press*) females frequently underestimate their performance, which again may have potentially damaging consequences on subsequent perfomance.

CG027876

THEORETICAL BACKGROUND

The framework of the study builds on current research on self-regulated learning (Schunk & Zimmerman, 1989). Some of the models trying to explain gender differences in achievement are based on the notion of autonomous and independent learning behavior (e.g., Fennema & Peterson, 1985). The underlying assumption in these models is that in order to learn to do tasks of high cognitive complexity one must engage in independent and persistent learning activity. In other words, besides employing proper "cognitive tools" in a learning task, students must also be motivated and committed to do so. As self-regulation of learning (SRL) refers to processes whereby students activate and sustain cognitions, behaviors, and affects that are systematically oriented toward the attainment of goals (Schunk 1994), it clearly provides an applicable conceptual basis for the study. However, defining regulation in SRL as individual's effective regulation of cognitive and metacognitive resources does not fully describe the complexity of regulatory activities students employ in natural learning situations (cf. Garcia, 1995). Learning situations are not always perceived as interesting and challenging tasks that require some cognitive and motivational effort. In other words, students' behavior in a classroom may be directed not only towards enlarging personal resources (e.g., gaining knowledge or improving skills), but also towards preventing losses of resources and distortions of well-being (e.g., protecting the self from esteem-threatening situations) (Boekaerts, 1993; Covington, 1992). This distinction between approach and avoidance motivation in achievement situations (see Elliot & Harackiewicz, 1996) holds an implicit assumption that self-regulation is inherent in goal-directed engagement (Carver & Scheier, 1991) and that it may emerge in different forms depending on the adaptive function of the action itself (see Niemivirta, 1996).

This is very illustrating in descriptions of children's reactions to failure in learning situations. For example, the early studies by Carol Dweck and her colleagues (Diener & Dweck, 1978; Dweck & Bempechat, 1983) demonstrate how some children's "helpless" pattern of behavior is characterized by an avoidance of challenge and attributing failure to lack of ability, whereas other children's "mastery" pattern is characterized by maintenance of effective striving under failure and seeking for challenging tasks. Subsequent research on this issue have led to a differentiation of three distinct sets of goals students may adopt in school (Ames & Archer, 1988; Dweck & Elliott, 1988; Nicholls, 1984): Individuals who pursue *learning goals* seek to improve their abilities and understanding; learning is valued as an end in itself. In contrast, individuals who pursue *performance goals* seek to demonstrate high ability or to gain favorable judgments of their abilities. While these two goals are oriented towards attaining something, a third type of goal, namely *avoidance goal* (see Nicholls, Patashnick and Nolen, 1985), involves a desire to put forth as little effort as possible and get away with it (i.e., a form of avoidance motivation). This is in accordance with Dweck and Leggett's (1988) notion that a behavioral pattern is a function of both goal *and* confidence in ability. When confidence is high, both learning and performance goals will produce high effort (although the *quality* of the engagement itself may vary; cf. Shraw et al. 1995), but when confidence is low, performance goals will produce "helplessness". Dweck and Bempechat (1983) have argued that the emergence of different motivational orientations is partially based on students' preconceptions about themselves and their relations to the surrounding world. These *implicit theories* – i.e., "alternative ways of constructing reality, each with its potential costs and benefits" (Dweck et al. 1995, p. 268) – then guide the choice and pursuit of goals.

Another related construct is students' means-ends beliefs (Skinner et al., 1988). Means-ends beliefs refer to individuals' expectancies about the extent to which certain classes of potential causes produce certain outcomes. It could be assumed, for example, that students who hold an incremental belief that ability is a fixed, nonmalleable trait (see Dweck & Leggett, 1988) might also believe that ability is the primary determinant of learning and achievement. In contrast, students who view ability as a malleable quality that can be changed and developed, might emphasize more effort as a means for learning.

The goals and motivational orientations students adopt also affect the strategies students utilize in learning situations. Learning oriented engagement is exemplified by an intrinsically motivated and task-focused learning activity that has its goals in personal knowledge construction. As student's intent is to understand and create meanings, s/he also uses (or tries to use) strategies that enable him or her to strive for that goal (i.e., deep processing strategies; see Pintrich & De Groot 1990). More extrinsically motivated and performance oriented student instead tries to do whatever is necessary to achieve, and thereby uses whatever strategies needed "to get the job done"– although mainly reproducing and fact-rote strategies (Graham & Golan, 1991; Meece, Blumenfeld, &

Hoyle, 1988; Nolen, 1988). A self-protective form of adaptive self-regulatory activity, in contrast, is grounded on avoiding potential negative outcomes. Thus, it arouses processes that interfere with optimal and constructive task engagement. Sensitivity to failure-relevant information and preoccupation with ability rather than task concerns lead easily to helpless patterns of behavior (Boekaerts, 1993; Lehtinen et al., 1995; Niemivirta, 1996).

The view presented above places explicitly the self at the nucleus of any self-regulatory activities (as the concept itself implies). That is, the beliefs individuals have construed about themselves and their relations to the surrounding world have an essential effect on the interpretations, choices, and acts they carry out in various situations (Skinner 1995). A number of studies have demonstrated how self-referenced beliefs affect students information processing and approaches to learning (for a review, see Schunk & Meece, 1992). It has been argued, for example, that students with high self-efficacy and perceived control work harder and persist longer on a task when facing difficulties, and, subsequently, they also perform better than students who lack self-efficacy (e.g., Schunk 1991) – even within the same ability level.

Although much of the research examining these relations have focused on individual – either *intra*individual (Pintrich & Garcia 1993) or *inter*individual (Zimmerman & Martinez-Pons 1990) – differences, only few have displayed explicit interest in examining whether the strength and patterning of the differences varies according to gender. The few studies conducted within the framework of self-regulated learning suggest that some repetitious differences might exist. In their study relating grade, gender, and giftedness to self-efficacy and strategy use, Zimmerman and Martinez-Pons (1990) concluded that the "findings show greater use of self-regulated learning strategies by girls despite their being lower than boys in verbal efficacy" (p. 57). Meece and Holt (1993) also found that girls were more likely to have learning as a primary goal, whereas boys were more inclined to performance goals. Similar results – although with older students – were found in a study by Bouffard, Boisvert, Vezeau, and Larouche (1995). Furthermore, their results also indicated a possibility that the relations between various motivational and cognitive factors might differ according to gender: for girls, only learning goals were related to active and effective cognitive engagement, whereas also performance goals had a somewhat similar relation for boys. Moreover, both Anderman and Young (1994) and Nolen (1988) found that girls were more inclined to task or learning goals, whereas boys emphasized more performance goals.

The present study was designed on the basis of the framework and results presented above. The purpose was to further examine gender differences in individual factors affecting self-regulated learning from a non-domain-specific perspective. Accordingly, the two main research questions were: 1) Are there any gender differences in dispositional factors related to self-regulated learning? 2) Are there gender differences in the patterning of these factors?

METHOD

Subjects and measures

The sample consisted of 628 seventh-graders (295 girls and 333 boys) from six junior high schools. Students responded to a self-report instrument which included subscales for goal orientation, perceived control, global self-esteem, and learning strategies. For measuring goal orientations three subscales were created. The scale for learning orientation contained 12 items for assessing students' focus on learning (e.g., "*I feel satisfied when I learn something new in school*"); the performance orientation scale included 11 items for assessing students' ability and evaluation concerns (e.g., "*I feel satisfied when I do better than other students*"); and the avoidance orientation scale contained 8 items for assessing students' concerns with minimizing effort (e.g., "*I am satisfied when I don't have to work hard in school*"). For assessing students' perceived control, an action-theoretical approach was used as a framework (Skinner, Chapman & Baltes 1988; Skinner, Wellborn & Connell 1990). Accordingly, perceived control was assessed multidimensionally by measuring three separate constructs. *Control beliefs* were assessed using 8 items tapping the extent to which students believe they are able to produce positive and prevent negative outcomes in the school domain (e.g., "*I can do well in school if I want to*"). *Means-ends beliefs* were measured using 15 items to which students reacted as three potential means or causes for success and failure in school: a) effort (5 items: e.g., "*You learn in school if you try enough*"), b) ability (5 items: "*If you don't learn it is because you are not smart enough*"), and c) external (5 items: "*If you do well in school it is because you are lucky*"). *Agency beliefs* were measured in a similar manner within two areas of interest: a) effort (5 items: e.g., "*I try hard in school*"), and b) ability (5

items: e.g., "*I have the ability to learn in school*"). Self-esteem was defined as individuals' general self-acceptance or their general positive or negative attitudes toward themselves (i.e., global self-esteem). The measurement consisted of 11 context-free items (e.g., "*In general, I like being the way I am*"). In addition, the questionnaire also included 32 items to assess students self-reported use of learning strategies. Items were selected to tap strategies that represent various dimensions of information processing; e.g., elaboration strategies ("*When I study for a test I try to translate the material into my own words*"), self-monitoring strategies (*When studying for a test I often stop reading and ask myself questions to see if I have understood anything*"), planning (*When I study for a test I set clear goals for myself*"), memorizing ("*When I study for a test I try to learn the material just by saying to myself over and over*") etc. Students rated each item on a 7-point Likert scale ranging from *totally disagree* (1) to *totally agree* (7). GPA was used as an indicator of school achievement.

Analyses

A series of factor analyses was used to examine the structural validity of the measurements. An analysis on the motivational components supported the predicted structure. For the cognitive components (i.e., learning strategies) a five factor solution was used to form separate scales for cognitive-motivational regulation (CMR), rote-learning, planning, detail memorizing, and elaborating (see Table 1 for descriptive statistics; correlations between all variables are in Appendix 1). Both variable-oriented and pattern-oriented approaches[2] were used in analyzing gender differences across all variables. Zero-order correlations and ANOVAs were used to examine gender differences in separate motivational and cognitive constructs. Furthermore, separate cluster analyses for girls and boys were used in order to categorize students on the basis of different goal orientations and to examine the patterning of goals and related variables. Finally, by using structural equation modeling, a mediational model in which goal orientations were assumed (a) to influence the self-reported use of learning strategies and subsequent school achievement, and (b) to mediate the effects of various self-referenced beliefs, was hypothesized and tested.

[2] In variable-oriented approach the conceptual and analytical unit of analyses is the variable, and the focus of interest is on mean differences. Pattern-oriented approach, on the other hand, focuses on value profiles of individuals as the basic sets of information (see Magnusson et al. 1991; Niemivirta, 1997).

Table 1. Descriptive Statistics and Reliabilities

Measure	M	SD	α
Goal orientations			
Learning orientation	5.15	.92	.89
Performance orientation	4.74	1.03	.85
Avoidance orientation	4.46	1.28	.88
Means-ends beliefs			
Effort	5.46	1.01	.73
Ability	3.40	1.13	.69
External†	2.51	1.21	.65
Agency beliefs			
Effort	4.68	1.22	.80
Ability	5.01	1.13	.83
Self-esteem	5.24	.98	.86
Control beliefs	5.54	.96	.83
Learning Strategies††			
CMR			.87
Rote-learning			.69
Planning			.80
Detail memorizing			.87
Elaborating			.68

† two items were excluded on the basis of an item analysis. †† Factor scores (M=0, SD=1) were used as the variables for learning strategies. Reliabilities are multiple correlations between the estimated factor scores and the true factor values.

RESULTS

Gender differences in motivation, learning strategy use, and achievement

One-way analysis of variance (ANOVA) on the motivational variables and learning strategies show that boys scored significantly higher than girls on performance orientation ($p<.001$), avoidance orientation ($p<.001$), means-ends beliefs of ability ($p<.05$), agency beliefs of ability ($p<.05$), self-esteem ($p<.001$), rote-learning strategies ($p<.01$), and detail memorizing ($p<.01$). In contrast, girls had higher GPAs ($p<.001$). Separate zero-order correlations between motivational variables and learning strategies, and achievement were calculated in order to examine if the magnitude of relations varied by gender (Table 2). Most of the

motivational variables and learning strategies were significantly related to overall school achievement. Strongest correlations were obtained between self-related beliefs and deep processing strategies (cognitive-motivational regulation and elaborating, respectively) and GPA. However, no significant differences in the magnitudes of correlations between boys and girls were found.

Table 2. Correlations Between Motivation and Learning Strategies with GPA by Gender

Measure	Boys (GPA)	Girls (GPA)
Goal orientations		
Learning orientation	.16 **	.25 **
Performance orientation	.03	.10
Avoidance orientation	-.17 **	-.14 *
Means-ends beliefs		
Effort	.05	.08
Ability	-.18 **	-.28 **
External	-.30 **	-.38 **
Agency beliefs		
Effort	.46 **	.32 **
Ability	.57 **	.53 **
Self-esteem	.38 **	.35 **
Control beliefs	.36 **	.43 **
Learning Strategies		
CMR	.34 **	.29 **
Rote-learning	-.21 **	-.20 **
Planning	-.04	-.05
Detail memorizing	.03	-.05
Elaborating	.19 **	.32 **

Note. * p<.05; **p<.01.

Gender differences in goal patterns

Separate K-Means cluster analyses for boys and girls were used to group students on the basis of their scores on goal orientations. Following the theoretical framework both solutions were forced to include three groups. The patterning of goal orientations were very similar in both groups (see Table 3). On the basis of the most dominant goal orientation in each group clusters were labeled as learning oriented (N_g=105; N_b=104), performance oriented (N_g=105; N_b=140), and avoidance oriented (N_g=85; N_b=89), respectively. In order to examine the validity of the grouping, and to find out in detail how the groups differed across other motivational and cognitive measures, an ANOVA was performed (Table 4).

Table 3. Group Differences on Goal Orientation Measures

	Learning		Performance		Avoidance	
Goal orientation	M	SD	M	SD	M	SD
Boys						
Learning orientation	5.80 [a]	.57	5.41 [a]	.61	4.20 [a]	.61
Performance orientation	4.54 [a]	.91	5.71 [a]	.55	4.25 [a]	.67
Avoidance orientation	3.31 [ab]	.71	5.24 [a]	.86	5.18 [b]	.90
Girls						
Learning orientation	5.96 [a]	.58	4.89 [a]	.74	4.25 [a]	.71
Performance orientation	4.40 [a]	1.03	5.33 [a]	.60	3.62 [a]	.62
Avoidance orientation	2.95 [a]	.79	5.13 [a]	.90	4.85 [a]	1.00

[1] Means with same letters are significantly different at the .05 level (Student-Newman-Keuls -test).

Table 4. Group Differences in Motivation and Learning Strategies

	Boys			Girls		
Measure	LO	PO	AO	LO	PO	AO
Means-ends beliefs						
Effort	5.66 [a]	5.83 [b]	4.88 [ab]	5.75 [a]	5.42 [a]	4.92 [a]
Ability	3.19 [a]	3.71 [a]	3.55	2.86 [a]	3.70 [a]	3.28 [a]
External	1.96 [a]	2.68 [a]	3.12 [a]	1.93 [ab]	2.62 [a]	2.86 [b]
Agency beliefs						
Effort	5.28 [a]	4.67 [a]	3.95 [a]	5.54 [a]	4.42 [a]	3.96 [a]
Ability	5.38 [a]	5.20 [b]	4.62 [ab]	5.51 [a]	4.83 [a]	4.28 [a]
Self-esteem	5.72 [a]	5.39 [a]	4.94 [a]	5.60 [ab]	4.86 [a]	4.76 [b]
Control beliefs	5.81 [a]	5.78 [b]	4.98 [ab]	6.04 [a]	5.50 [a]	4.81 [a]
Learning Strategies						
CMR	.43 [a]	.00 [a]	-.72 [a]	.68 [a]	-.08 [a]	-.51 [a]
Rote-learning	-.25 [a]	.39 [a]	-.01 [a]	-.52 [a]	.25 [a]	-.00 [a]
Planning	.36 [a]	-.04 [a]	-.47 [a]	.58 [ab]	-.17 [a]	-.40 [b]
Detail memorizing	.19 [a]	.32 [b]	-.34 [ab]	.11 [a]	-.09 [b]	-.42 [ab]
Elaborating	.22 [a]	-.12 [b]	-.52 [ab]	.38 [a]	.02 [a]	-.42 [a]
GPA	8.05 [a]	7.90 [b]	7.63 [ab]	8.39 [a]	8.28 [b]	8.03 [ab]

[1] Means with same letters are significantly different at the .05 level (Student-Newman-Keuls -test). CMR = Cognitive-motivational regulation; LO=Learning oriented; PO= Performance oriented; AO=Avoidance oriented.

BEST COPY AVAILABLE

Similar effects were found for both boys and girls (see Figures 1 and 2 for illustrative profiles). Avoidance oriented students distinguished clearly from other groups by the fact that their self-perceptions were relatively low. They also reported using significantly less higher order learning strategies than others. Learning oriented students, in contrast, had high scores on effort-related agency beliefs and self-esteem. They also endorsed deep processing strategies end effort-related means-ends beliefs. Similarly, performance oriented students emphasized effort, but in addition, they also had higher scores in ability-related means-ends beliefs. Furthermore, they also endorsed rote learning and detail memorizing. In sum, the patterning of various measures clearly supported the predicted motivational-cognitive profiles of students with different approaches to learning. To further examine the similarity of motivational profiles within goal groups, a series of t-tests was performed within corresponding goal groups (Table 5). Although the few differences found were similar to those of the overall comparison, some interesting effects emerged: performance oriented boys differed from performance oriented girls clearly in that they scored significantly higher on learning orientation ($p<.01$), performance orientation ($p<.01$), effort-related means-ends beliefs ($p<.01$), and self-esteem. In addition, performance oriented boys endorsed higher level of detail memorizing compared to girls ($p<.01$). Learning oriented girls, instead, reported using significantly ($p.<05$) more deeper level learning strategies than learning oriented boys.

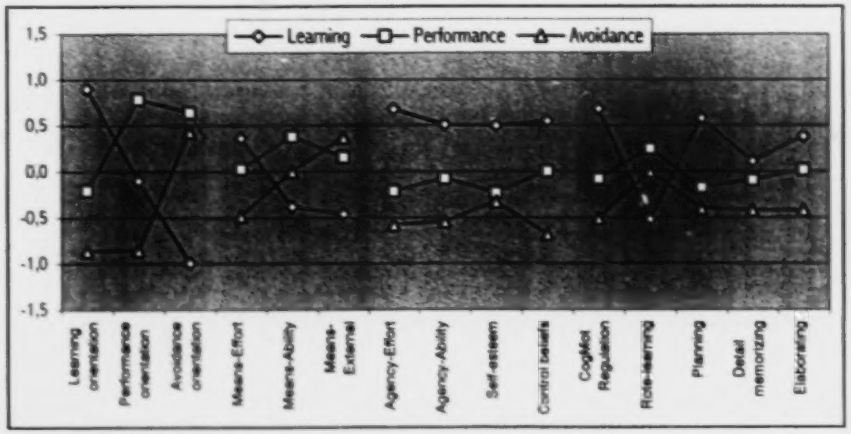

Figure 1. Motivational profiles (z-scores) in different goal group (girls)

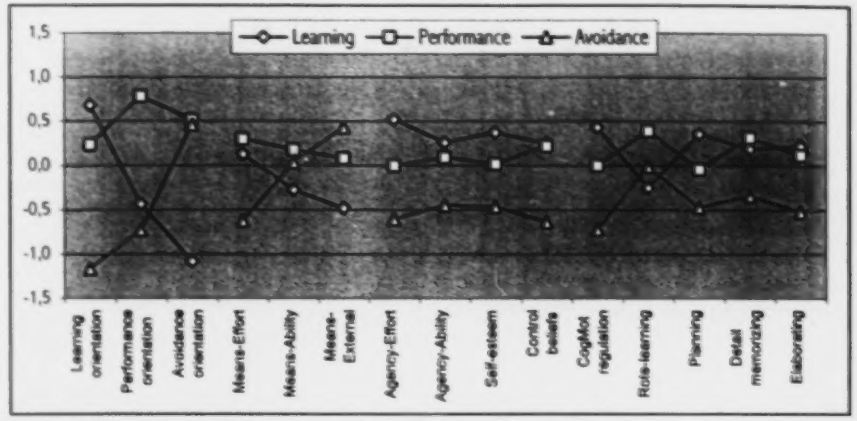

Figure 2. Motivational profiles (z-scores) in different goal group (boys)

Table 5. Gender Differences in Motivation and Learning Strategies

	Learning		Performance		Avoidance	
Measure	Girls	Boys	Girls	Boys	Girls	Boys
Goal orientation						
Learning orientation	5.96	5.80 *	4.89	5.41 **	4.25	4.20 *
Performance orientation	4.40	4.54	5.33	5.71 **	3.62	4.25 **
Avoidance orientation	2.95	3.31 **	5.13	5.24	4.85	5.18
Means-ends beliefs						
Effort	5.75	5.66	5.43	5.83 **	4.92	4.88
Ability	2.86	3.19 *	3.70	3.71	3.28	3.55
External	1.93	1.96	2.62	2.68	2.86	3.12
Agency beliefs						
Effort	5.54	5.28	4.42	4.67	3.96	3.95
Ability	5.51	5.38	4.83	5.20 *	4.28	4.62 *
Self-esteem	5.60	5.72	4.86	5.39 **	4.76	4.94
Control beliefs	6.04	5.81 *	5.50	5.78 *	4.81	4.98
Learning Strategies						
CMR	.68	.43 *	-.08	.00	-.51	-.72
Rote-learning	-.52	-.25 *	.25	.39	-.00	-.01
Planning	.58	.36 *	-.17	-.04	-.40	-.47
Detail memorizing	.11	.19	-.09	.32 **	-.42	-.34
Elaborating	.38	.22	.02	-.12	-.42	-.52
GPA	8.39	8.05 **	8.28	7.90 **	8.03	7.63 **

BEST COPY AVAILABLE

SEM-models of motivational and cognitive factors predicting school achievement

Using structural equation modeling, similar mediational models in which goal orientations were assumed (a) to influence the self-reported use of learning strategies and subsequent school achievement[3], and (b) to mediate the effects of various self-referenced beliefs, were constructed and tested for both boys and girls. Item parcels were used as indicators of latent variables, and covariance matrixes were used as the basis for the analysis.

A baseline model for the whole sample was specified in which the effects of means-ends beliefs were indirect in nature. They were mediated by measures of goal orientations, which in turn were mediated by learning strategies.[4] Thus, direct paths were estimated from means-ends beliefs to goal orientations; from goal orientations to learning strategies; and from learning strategies to school achievement. The baseline model fitted the data well (Table 6). Significant effects in the model are illustrated in Figure 3.

The next step was to test the invariance (i.e., equality) of estimates between boys and girls. The best fitting model (see Table 6) was estimated with free parameters on both measurement models (e.g., loadings on latent variables) and structural models (e.g., path coefficients). Some minor differences between submodels for boys and girls were found. Unlike boys, girls had significant effects from ability-related means-ends beliefs to performance orientation, and from performance orientation to surface processing. Boys instead had an additional effect from learning orientation to surface processing, and a significant (negative) effect from surface processing to GPA (Figures 4 and 5).

Table 6. Goodness-of-Fit Indexes for Estimated SEM-Models

Goal orientation	χ^2	df	χ^2/ df	GFI	NNFI	IFI	RMS
Baseline model (total sample)	219.06	96	2.28	.95	.94	.96	0.05
Simultaneous model	336.58	192	1.75	.91	.94	.96	0.05

GFI = Goodnes-of-Fit Index (Jöreskog & Sörbom, 1989); NNFI = Non-Normed Fit Index (Bentler, 1990); IFI = Incremental Fit Index (Bollen, 1989). RMS = Root Mean Square.

[3] A grade-point-average measured at the end of 7th grade was used as an indicator of school performance.

[4] To achieve a greater simplicity in the complex model, all five scales for learning strategies were aggregated into two higher order factors: deep and surface processing, respectively.

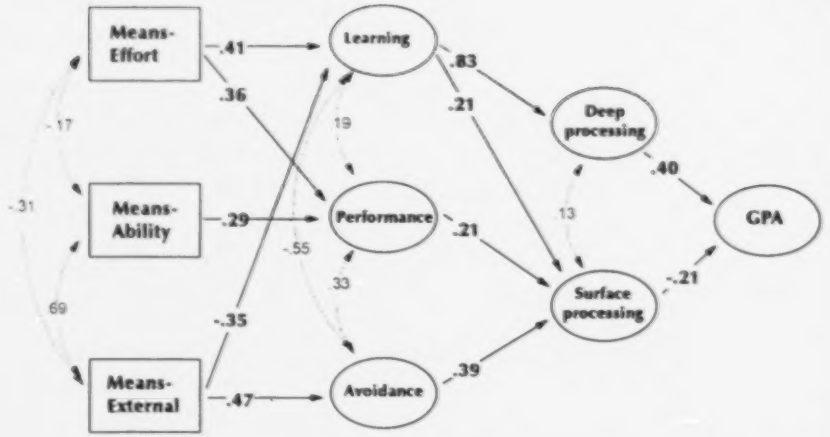

Figure 3. A SEM-model of motivational and cognitive factors predicting school achievement (total sample). (Solid lines represent significant effects [p<.05].)

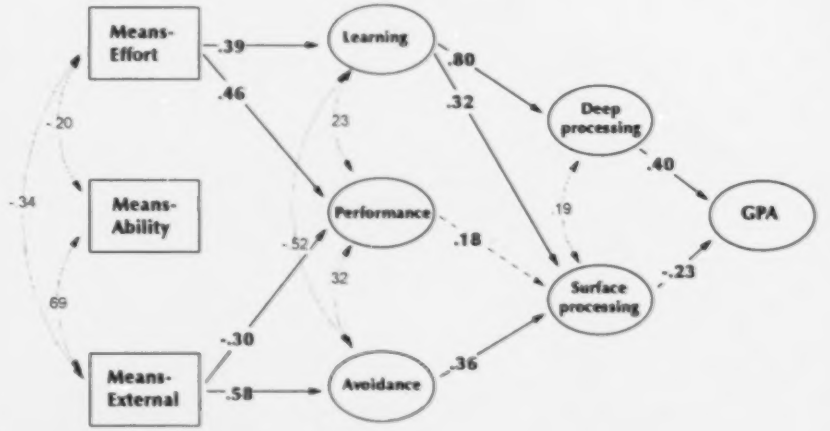

Figure 4. A SEM-model of motivational and cognitive factors predicting school achievement (boys). (Solid lines represent significant effects [p<.05], dotted line [p<.10]).

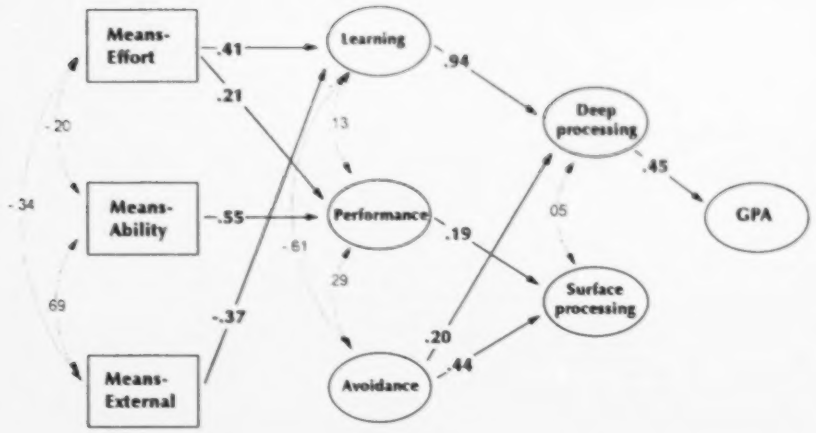

Figure 5. A SEM-model of motivational and cognitive factors predicting school achievement (girls). (Solid lines represent significant effects [p<.05].)

DISCUSSION AND CONCLUSIONS

The purpose of the study was to examine gender differences in various motivational and cognitive variables related to self-regulated learning. A dispositional approach to motivation was adopted in order to examine individual differences at a general (i.e., non-domain-specific) level. The theoretical rationale was based on recent research on self-regulated learning. It was assumed that the beliefs students hold about themselves and learning would affect the way students approach and engage in learning situations, and furthermore, that these sets of beliefs would result in different motivational profiles.

In general, the results were consistent with previous research. Relations found between motivational factors and learning strategies conformed to the findings of other studies (e.g., Ames & Archer, 1988; Meece, Blumenfeld & Hoyle, 1988; Nolen, 1988; Pintrich & DeGroot, 1990). For example, learning focused goals were related to control beliefs, self-esteem, and deep processing strategies, whereas avoidance orientation had significant negative relations with self-related beliefs and active engagement in learning. Performance orientation, instead, was associated with ability-related means-ends beliefs and a preference for surface strategies indicating a somewhat more ability and outcome-focused aspect of learning activity.

Results concerning gender differences provide new evidence against the assumption of girls adopting a superficial approach to learning. Although boys had high self-confidence and positive self-perceptions, they were significantly more inclined to performance goals and reported using more surface level learning strategies (i.e., rote-learning and detail memorizing) than girls. Motivational profiles *per se* were very similar for both gender, but indications of some minor differences were detected. For example, although the goal patterns (i.e., relative value profiles) for performance oriented students were highly similar, boys had significantly higher scores in effort-related means-ends beliefs and reported use of superficial learning strategies. These differences might indicate that a performance oriented engagement represents a somewhat more active and outcome-focused approach to learning for boys than for girls. In other words, for boys, a performance oriented activity in the classroom might exemplify a convenient way of demonstrating competence and gaining attention from peers. This form of self-enhancing behavior – especially for males – is in agreement with research concerning the use of self-presentational strategies (for a review, see Banaji & Prentice, 1994). This assumption of somewhat different mechanisms and motives underlying performance orientation for boys and girls was partially supported by hypothetical causal models. However, the explanatory power of these models were only moderate, so the results should be interpreted with care.

In sum, results obtained in the present study have implications for both the research on self-regulated learning in general and gender differences in particular. The minor but systematic differences found between boys' and girls' motivational orientations point out the social (or socialized) nature of the core beliefs students hold about themselves. In the course of development individuals create standards for their behaviors mostly on the basis of social feedback (Bandura, 1986). Thus, results suggesting that boys emphasize performance and outcomes as indications of success (at least in relation to school) more than girls might actually illustrate their different ways of coping with social pressure and perceiving environmental expectations.

This study also demonstrate how students predispositions to various forms of self-regulatory activity have solid grounds in individual goals and motivational beliefs. That is, the beliefs students hold provide a guidance for the

course of actions they prepare to carry out in various situations. It is therefore important to realize that individual self-regulation always stems from personal responses to environmental and situational demands. Self-regulatory actions are not be understood only as some effective forms of engagement, but as various forms of adaptive activity that help to maintain personal psychological well-being (cf. Boekaerts, 1996).

Motivational and cognitive determinants of learning and their underlying mechanisms in general are of central interest in current research. However, it is also evident that various cultural and contextual factors affecting it should also be considered. This study, considering gender differences, is a modest attempt to strive towards this goa!. At a general level, the results provide important cross-cultural information for the ongoing research on both motivation and self-regulated learning, and gender differences. However, in order to fully capture the dynamics and developmental nature of these phenomena, future research should focus on activities and processes that occur in natural learning situations.

REFERENCES

Ames, C. & Archer, J. (1988). Achievement goals in the classroom: Student learning strategies and motivational processes. *Journal of Educational Psychology*, 80, 260-267.

Ames, C. (1992). Classrooms: goals, structures, and student motivation. *Journal of Educational Psychology*, 84, 261-271.

Anderman, E. M. & Young, A. J. (1994). Motivation and strategy use in science :Individual differences and classroom effects. *Journal of Research in Science Teaching*. 8, 811-831.

Banaji, M. R. & Prentice, D. A. (1994). The self in social contexts. *Annual Review of Psychology*, 45, 297-332.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliff, NJ: Prentice-Hall.

Benbow, C. & Stanley, J. (1982). Consequences in high school and college of sex differences in mathematical reasoning ability: A longitudinal perspective. American Educational Research Journal, 4, 598-622.

Bentler, P. M. (1990). Fit indexes, lagrange multipliers, constraint changes and incomplete data in structural models. *Multivariate Behavioral Research*, 25(2), 163-173.

Beyer, S. & Bowden, E. M. (in press). Gender differences in self-perceptions: Convergent evidence from three measures of accuracy and bias. *Personality and Social Psychology Bulletin*.

Bohlin, C. F. (1994). Learning style factors and mathematics performance: Sex-related differences. *International Journal of Educational Research*, 4, 387-398.

Bollen, K. A. (1989). *Structural equations with latent variables*. New York: John Wiley & Sons.

Boekaerts, M. (1993). Being concerned with well-being and with learning. *Educational Psychologist*, 28, 149-167.

Boekaerts, M. (1996). Self-regulated learning at the junction of cognition and motivation. *European Psychologist*, 1, 100-112.

Bouffard, T., Boisvert, J., Vezeau, C. & Larouche, C. (1995). The impact of goal orientation on self-regulation and performance among college students. *British Journal of Educational Psychology*, 65, 317-329.

Carver, C. S. & Scheier, M. F. (1991). Self-regulation and the self. In Strauss, J. & Goethals, G. R. (eds.): *The self: Interdisciplinary approaches*. NY: Springer-Verlag.

Covington, M. V. (1992). *Making the grade. A self-worth perspective on motivation and school reform*. Cambridge University Press.

Diener, C. I. & Dweck, C. S. (1978). An analysis of learned helplessness: Continuous changes in performance, strategy and achievement cognitions following failure. *Journal of Personality and Social Psychology*, 36, 451-462.

Dweck, C. S. & Bempechat, J. (1983). Children's theories of intelligence: Consequences for learning. In Paris, S. G., Olson, G. M. & Stevenson, H. W. (eds.) *Learning and Motivation in the Classroom*. Hillsdale, NJ: Erlbaum.

Dweck, C. S. & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, 95, 256-273.

Eccles, J. S. (1985). Sex differences in achievement patterns. In T. Sonderegger (ed.) *Nebraska Symposium of Motivation*, Vol. 32. Lincoln, NE: University of Nebraska Press.

Eccles-Parsons, J., Adler, T. F. & Kaczala, C. M. (1982). Socialization of achievement attitudes and beliefs: Parental influences. *Child Development*, 53, 310-321.

Elliot, A. J. & Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediatonal analysis. *Journal of Personality and Social Psychology*, 70, 461-475.

Emanuelsson, I. & Fischbein, S. (1986). Vive la difference? A study on sex and schooling. *Scandinavian Journal of Educational Research*, 2, 71-84.

Fennema, E. Peterson, P. (1985). Autonomous learning behavior: A possible explanation of gender-related differences in mathematics. In L. C. Wilkinson & C. B. Marrett (eds.) *Gender influences in classroom interaction*. Orlando, FL: Academic Press.

Garcia, T. (1995). The Role of Motivational Strategies in Self-Regulated Learning. In P. R. Pintrich (ed.) *Understanding Self-Regulated Learning*. San Francisco: Jossey-Bass Publishers.

Dweck, C. S., Chiu, C. & Hong, Y. (1995). Implicit theories and their role in judgments and reactions: A world from two perspectives. *Psychological Inquiry*, 6(4), 267-285.

Halpern, D. F. (1992). *Sex differences in cognitive abilities*. (2nd ed.) Hillsdale, NJ: Erlbaum.

Hyde, J. S., Fennema, E. & Lamon, J. (1990). Gender differences in matemathics performance: A meta-anaysis. *Psychological Bulletin*, 107, 139-153.

Kahle, J. B. & Meece, J. (1994). Research on gender issues in the classroom. In D. L. Gabel (ed.) *Handbool of Research on Science Teaching and Learning*. Washington, DC: National Science Teachers Association.

Kimball, M. M. (1989). A new perspcetive on women's math achievement. *Psychological Bulletin*, 2, 198-214.

BEST COPY AVAILABLE

Lehtinen, E., Vauras, M., Salonen, P., Olkinuora, E. & Kinnunen, R. (1995). Long-term development of learning activity: Motivational, cognitive, and social interaction. *Educational Psychologist*, 30, 21-35.

Linn, M. C. & Hyde, J. S. (1989). Gender, mathematics, and science. *Educational Researcher*, 18, 17-27.

Maccoby, E. E. & Jacklin, C. N. (1974). *The psychology of sex difference*. Stanford, CA: Stanford University Press.

Magnusson, D., Bergman, L. R., Rudiner, G., & Törestad, B. (eds.) (1991). *Problems and methods in longitudinal research: Stability and change*. Cambridge: Cambridge University Press.

March, H. W. (1989). Sex differences in the development of verbal and mathematics constructs: The High School and Beyond Study. *American Educational Research Journal*, 26, 191-225.

Meece, J. L. & Holt, K. (1993). A pattern analysis of students' achievement goals. *Journal of Educational Psychology*, 85, 582-590.

Meece, J. L., Blumenfeld, P. C. & Hoyle, R. H. (1988). Students goal orientation and cognitive engagement in classroom activities. *Journal of Educational Psychology*, 80, 514-523.

Meece, J. L. & Jones, M. G. (1996). Gender differences in motivation and strategy use in science: Are girls rote learners? *Journal of Research in Science Teaching*, 4, 393-406.

Meece, J. L. & Holt, K. (1993). A Pattern Analysis of Students' Achievement Goals. *Journal of Educational Psychology*, 85, 582-590.

Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review*, 91, 328-346.

Nicholls, J. G., Patashnick, M. & Nolen, S. B. (1985). Adolescents' theories of education. *Journal of Educational Psychology*, 77, 683-692.

Niemivirta, M. J. (1997). Individual differences in motivational and cognitive factors affecting self-regulated learning – A pattern-oriented approach. *Empirische Pädagogik*. Submitted.

Niemivirta, M. J. (1996, September). *Intentional and Adpative Learning Modes – The Self at Stake*. Paper presented at the 2nd European Conference on Education. Sevilla, Spain.

Nolen, S. B. (1988). Reasons for studying: Motivational orientations and study strategies. *Cognition and Instruction*, 5, 269-287.

Pintrich, P. & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, 82, 33-40.

Pintrich, P. R. & Garcia, T. (1993). Intraindividual differences in students' motivation and self-regulated learning. *Zeitschrift für Pädagogische Psychologie*, 7, 99-107.

Pintrich, P. R. & Schrauben, B. (1992). Students' motivational beliefs and their cognitive engagement in classroom academic tasks. In D. H. Schunk & J. L. Meece (eds.) *Student Perceptions in the Classroom*. Hillsdale, NJ: Erlbaum.

Schunk, D. & Meece, J. (eds.). (1992). *Student's perceptions in the classroom: Causes and consequences*. Hillsdale, NJ: Erlbaum.

Schunk, D. H. & Zimmerman, B. J. (eds.) (1994). *Self-Regulation of Learning and Performance. Issues and Educational Applications*. Hillsdale, NJ: Erlbaum.

Schunk, D. H. (1994). Self-regulation of self-efficacy and attributions in academic settings. In D. H. Schunk & B. J. Zimmerman (eds.) *Self-Regulation of Learning and Performance. Issues and educational Applications*. Hillsdale, NJ: Erlbaum.

Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational Psychologist*, 26, 207-231.

Shraw, G., Horn, C., Thorndike-Christ, T. & Bruning, R. (1995). Academic goal orientations and student classroom achievement. *Contemporary Educational Psychology*, 20, 359-368.

Skaalvik, E. M. & Rankin, R. J. (1994). Gender differences in mathematics and verbal achievement, self-perception and motivation. *British Journal of Educational Psychology*, 64, 419-428.

Skinner, E. A., Chapman, M. & Baltes, P. B. (1988). Control, means-ends, and agency beliefs: A new conceptualization and its measurement during childhood. *Journal of Personality and Social Psychology*, 54, 117-133.

Skinner, E. A, Wellborn, J. G. & Connell, J. P. (1990). What it takes to do well in school and whether I've got it. *Journal of Educational Psychology*, 82, s. 22-32.

Skinner, E. A. (1995). *Perceived Control, Motivation, and Coping*. Thousand Oaks, CA: Sage.

Stockard, J. & Wood, W. (1984). The myth of female underachievement: A re-examination of sex differences in academic achievement. *American Educational Research Journal*, 21, 825-838.

Stumpf, H. (1995). Gender differences in performance on tests of cognitive abilities: Experimental design issues and empirical results. *Learning and Individual Differences*, 4, 275-288.

Undheim, J. O. & Nordvik, H. (1992). Socio-economic factors and sex differences in an egalitarian educational system: Academic achievement in 16-year-old Norwegian students. *Scandinavian Journal of Educational Research*, 2, 87-98.

Zimmerman, B. & Schunk, D. (eds.). (1989). *Self-Regulated Learning and Academic Achievement: Theory, Research and Practice*. New York: Springer-Verlag.

Zimmerman, B. J. & Martinez-Pons, M. (1990). Student differences in self-regulated learning: Relating grade, sex, and giftedness to self-efficacy and strategy use. *Journal of Educational Psychology*, 82, 51-59.

BEST COPY AVAILABLE

Appendix 1. Correlations between motivational variables and learning strategies.

	Learning	Performance	Avoidance	M_effort	M_ability	M_external	A_effort	A_agency	Self-esteem	Control	CMR	Rote learning	Planning	Details	Elaborating	GPA
Learning	1,00	,26**	-,48**	,42**	-,13**	-,32**	,55**	,43**	,38**	,49**	,64**	-,09	,53**	,38**	,55**	,18**
Performance	,26**	1,00	,21**	,24**	,20**	,01	,11**	,20**	,09	,28**	,17**	,27**	,06	,26**	,18**	,01
Avoidance	-,48**	,21**	1,00	-,08	,24**	,31**	-,42**	-,20**	-,20**	-,18**	-,39**	,37**	-,43**	-,08	-,17**	-,19**
M_Effort	,42**	,24**	-,08	1,00	-,07	-,27**	,13**	,28**	,24**	,51**	,31**	,11**	,17**	,18**	,26**	,04
M_Ability	-,13**	,20**	,24**	-,07	1,00	,38**	-,16**	-,36**	-,30**	-,26**	-,14**	,29**	,08	,09	-,09	-,24**
M_External	-,32**	,01	,31**	-,27**	,38**	1,00	-,24**	-,38**	-,35**	-,37**	-,34**	,22**	-,01	-,05	-,20**	-,34**
A_Effort	,55**	,11**	-,42**	,13**	-,16**	-,24**	1,00	,56**	,46**	,40**	,51**	-,08	,39**	,29**	,33**	,38**
A_Ability	,43**	,20**	-,20**	,28**	-,36**	-,38**	,56**	1,00	,70**	,71**	,44**	-,16**	,11**	,15**	,36**	,51**
Self-esteem	,38**	,09	-,20**	,24**	-,30**	-,35**	,46**	,70**	1,00	,62**	,39**	-,12**	,14**	,23**	,37**	,31**
Control beliefs	,49**	,28**	-,18**	,51**	-,26**	-,37**	,40**	,71**	,62**	1,00	,44**	-,04	,20**	,23**	,44**	,37**
CMR	,64**	,17**	-,39**	,31**	-,14**	-,34**	,51**	,44**	,39**	,44**	1,00	-,06	,48**	,47**	,61**	,32**
Rote learning	-,09	,27**	,37**	,11**	,29**	,22**	-,08	-,16**	-,12**	-,04	-,06	1,00	-,05	,31**	-,08	-,23**
Planning	,53**	,06	-,43**	,17**	,08	-,01	,39**	,11**	,14**	,20**	,48**	-,05	1,00	,39**	,37**	-,04
Details	,38**	,26**	-,08	,18**	,09	-,05	,29**	,15**	,23**	,23**	,47**	,31**	,39**	1,00	,30**	-,04
Elaborating	,55**	,18**	-,17**	,26**	-,09	-,20**	,33**	,36**	,37**	,44**	,61**	-,08	,37**	,30**	1,00	,25**
GPA	,18**	,01	-,19**	,04	-,24**	-,34**	,38**	,51**	,31**	,37**	,32**	-,23**	-,04	-,04	,25**	1,00

**. Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.01 level (2-tailed), CMR = cognitive and motivational regulation

BEST COPY AVAILABLE